CLAIMS:

1. A method comprising:
estimating a length of a refractory period of a heart; and
setting a parameter for delivery of extra-systolic stimulation to the heart based on the estimated length.

2. The method of claim 1, wherein setting a parameter for delivery of extra-systolic stimulation comprises setting an extra-systolic interval.

3. The method of claim 2, wherein setting the extra-systolic interval based on the estimated length comprises adding an amount of time to the estimated length.

4. The method of claim 1, wherein estimating the length of the refractory period comprises:
detecting a systolic depolarization of the heart;
delivering a probe pulse to the heart an interval after detection of the systolic depolarization that is less than an extra-systolic interval;
determining whether the probe pulse captured the heart; and
estimating the length of the refractory period based on the determination.

5. The method of claim 4, wherein determining whether the probe pulse captured the heart comprises:
monitoring electrical activity within the heart; and
detecting whether delivery of the probe pulse resulted in an evoked response.

6. The method of claim 4, wherein determining whether the probe pulse captured the heart comprises:

monitoring an intracardiac pressure; and

determining whether the probe pulse captured the heart based on a rate of change of the intracardiac pressure subsequent to delivery of the probe pulse.

7. The method of claim 4, wherein delivering a probe pulse comprises delivering a probe pulse every N cardiac cycles, N being an integer greater than one, the method further comprising delivering an extra-systolic pulse the extra-systolic interval after detection of a systolic depolarization of the heart during cardiac cycles in which a probe pulse is not delivered.

8. The method of claim 4,

wherein delivering a probe pulse comprises:

delivering a first probe pulse a first interval after detection of a first systolic depolarization of a first cardiac cycle;

delivering a second probe pulse a second interval after detection of a second systolic depolarization of a second cardiac cycle; and

determining that the first probe pulse captured the heart and the second probe pulse did not capture the heart, and

wherein estimating the length of the refractory period comprises estimating the length of the refractory period as a value between the first and second intervals.

9. The method of claim 4, further comprising:

determining that the probe pulse captured the heart; and decreasing the interval for delivery of a subsequent probe pulse.

10. The method of claim 9, further comprising:

determining that the subsequently delivered probe pulse captured the heart; and

delivering a probe pulse every cardiac cycle until one of the delivered probe pulses does not capture the heart in response to the determination, each probe pulse delivered an interval after detection of a systolic depolarization of the heart that is less than a previous probe pulse.

11. The method of claim 4, further comprising:

determining that the probe pulse did not capture the heart; and

increasing the interval for delivery of a subsequent probe pulse.

12. The method of claim 11, further comprising:

determining that the subsequently delivered probe pulse did not capture the heart; and

delivering a probe pulse every cardiac cycle until one of the delivered probe pulses captures the heart in response to the determination, each probe pulse delivered an interval after detection of a systolic depolarization of the heart that is greater than a previous probe pulse.

13. A medical device comprising:

electrodes; and

a processor to control delivery of extra-systolic stimulation to a heart of a patient via the electrodes as a function of a parameter, wherein the processor estimates a length of a refractory period of the heart, and sets a value for the parameter based on the estimated length.

14. The medical device of claim 13, wherein the parameter is an extra-systolic interval.

15. The medical device of claim 14, wherein the processor sets the value for the extra-systolic interval by adding an amount of time to the estimated length of the refractory period.

16. The medical device of claim 13, wherein the processor detects a systolic depolarization of the heart via the electrodes, controls delivery of a probe pulse to the heart an interval after detection of the systolic depolarization that is less than an extra-systolic interval, determines whether the probe pulse captured the heart, and estimates the length of the refractory period based on the determination.

17. The medical device of claim 16, wherein the processor monitors electrical activity within the heart via the electrodes, determines whether delivery of the probe pulse resulted in an evoked response based on the electrical activity to determine whether the probe pulse captured the heart.

18. The medical device of claim 16, further comprising a pressure sensor, wherein the processor monitors an intracardiac pressure via the pressure sensor, and determines whether the probe pulse captured the heart based on a rate of change of the intracardiac pressure subsequent to delivery of the probe pulse.

19. The medical device of claim 16, wherein the processor controls delivery of a probe pulse every N cardiac cycles, N being an integer greater than one, and controls delivery of an extra-systolic pulse the extra-systolic interval after detection of a systolic depolarization of the heart during cardiac cycles in which a probe pulse is not delivered.

20. The medical device of claim 16, wherein the processor controls delivery of a first probe pulse a first interval after detection of a first systolic depolarization of a first cardiac cycle and a second probe pulse a second interval after a second systolic depolarization of a second cardiac cycle, determines that the first probe pulse captured the heart and the second probe pulse did not capture the heart, and estimates the length of the refractory period as a value between the first and second intervals.

21. The medical device of claim 16, wherein the processor determines that the probe pulse captured the heart, and decreases the interval for delivery of a subsequent probe pulse.

22. The medical device of claim 21, wherein the processor determines that the subsequently delivered probe pulse captured the heart, and controls delivery of a probe pulse every cardiac cycle until one of the delivered probe pulses does not capture the heart in response to the determination, each probe pulse delivered an interval after detection of a systolic depolarization of the heart that is less than a previous probe pulse.

23. The medical device of claim 16, wherein the processor determines that the probe pulse did not capture the heart, and increases the interval for delivery of a subsequent probe pulse.

24. The medical device of claim 23, wherein the processor determines that the subsequently delivered probe pulse did not capture the heart, and controls delivery of a probe pulse every cardiac cycle until one of the delivered probe pulses captures the heart in response to the determination, each probe pulse delivered an interval after detection of a systolic depolarization of the heart that is greater than a previous probe pulse.

25. The medical device of claim 13, wherein the medical device is implantable within the patient.

26. The medical device of claim 13, wherein the medical device is a pacemaker.

27. A computer-readable medium comprising instructions that cause a programmable processor to:

estimate a length of a refractory period of a heart; and

set a parameter for delivery of extra-systolic stimulation to the heart based on the estimated length.

28. The computer-readable medium of claim 27, wherein the parameter comprises an extra-systolic interval.

29. The computer-readable medium of claim 27, wherein the instructions the instructions that cause a programmable processor to estimate the length of the refractory period comprise instructions that cause a programmable processor to:

detect a systolic depolarization of the heart;

control delivery of a probe pulse to the heart an interval after detection of the systolic depolarization that is less than an extra-systolic interval;

determine whether the probe pulse captured the heart; and

estimate the length of the refractory period based on the determination.

30. The computer-readable medium of claim 29, wherein the instructions that cause a programmable processor to control delivery of a probe pulses comprise instructions that cause a programmable processor to control delivery of a first probe pulse a first interval after detection of a first systolic depolarization of a first cardiac cycle and a second probe pulse a second interval after detection of a second systolic depolarization of a second cardiac cycle,

the medium further comprising instructions that cause a programmable processor to determine that the first probe pulse captured the heart and the second probe pulse did not capture the heart, and

wherein the instructions that cause a programmable processor to estimate the length of the refractory period comprise instructions that cause a programmable processor to estimate the length of the refractory period as a value between the first and second intervals.

31. The computer-readable medium of claim 29, further comprising instructions that cause a programmable processor to:

determine that the probe pulse captured the heart; and

decrease the interval for delivery of a subsequent probe pulse.

32. The computer-readable medium of claim 31, further comprising instructions that cause a programmable processor to:

determine that the subsequently delivered probe pulse captured the heart; and

control delivery of a probe pulse every cardiac cycle until one of the delivered probe pulses does not capture the heart in response to the determination, each probe pulse delivered an interval after detection of a systolic depolarization of the heart that is less than a previous probe pulse.

33. The computer-readable medium of claim 29, further comprising instructions that cause a programmable processor to:

determine that the probe pulse did not capture the heart; and

increase the interval for delivery of a subsequent probe pulse.

34. The computer-readable medium of claim 33, further comprising instructions that cause a programmable processor to:

determine that the subsequently delivered probe pulse did not capture the heart; and

control delivery of a probe pulse every cardiac cycle until one of the delivered probe pulses captures the heart in response to the determination, each probe pulse delivered an interval after detection of a systolic depolarization of the heart that is greater than a previous probe pulse.

35. A method comprising:

detecting a systolic depolarization of a heart;

delivering a probe pulse an interval after detection of the systolic depolarization;

determining whether the probe pulse captured the heart; and

estimating a length of a refractory period of the heart based on the determination.

36. The method of claim 35,

wherein delivering a probe pulse comprises:

delivering a first probe pulse a first interval after detection of a first systolic depolarization of a first cardiac cycle;

delivering a second probe pulse a second interval after detection of a second systolic depolarization of a second cardiac cycle; and

determining that the first probe pulse captured the heart and the second probe pulse did not capture the heart, and

wherein estimating the length of the refractory period comprises estimating the length of the refractory period as a value between the first and second intervals.

37. The method of claim 35, further comprising:

determining that the probe pulse captured the heart; and

decreasing the interval for delivery of a subsequent probe pulse.

38. The method of claim 37, further comprising:

determining that the subsequently delivered probe pulse captured the heart; and

delivering a probe pulse every cardiac cycle until one of the delivered probe pulses does not capture the heart in response to the determination, each probe pulse delivered an interval after detection of a systolic depolarization of the heart that is less than a previous probe pulse.

39. The method of claim 35, further comprising:

determining that the probe pulse did not capture the heart; and

increasing the interval for delivery of a subsequent probe pulse.

40. The method of claim 39, further comprising:

determining that the subsequently delivered probe pulse did not capture the heart; and

delivering a probe pulse every cardiac cycle until one of the delivered probe pulses captures the heart in response to the determination, each probe pulse delivered an interval after detection of a systolic depolarization of the heart that is greater than a previous probe pulse.

41. The method of claim 35, further comprising setting a parameter for delivery of extra-systolic stimulation to the heart based on the estimated length.

42. The method of claim 41, wherein setting a parameter for delivery of extra-systolic stimulation comprises setting an extra-systolic interval.

43. A medical device comprising:

electrodes; and

a processor to detect a systolic depolarization of a heart of a patient via the electrodes, control delivery of a probe pulse via the electrodes an interval after detection of the systolic depolarization, determine whether the probe pulse captured the heart, and estimate a length of a refractory period of the heart based on the determination.

44. The medical device of claim 43, wherein the processor controls delivery of a first probe pulse a first interval after detection of a first systolic depolarization of a first cardiac cycle and a second probe pulse a second interval after a second systolic depolarization of a second cardiac cycle, determines that the first probe pulse captured the heart and the second probe pulse did not capture the heart, and estimates the length of the refractory period as a value between the first and second intervals.

45. The medical device of claim 43, wherein the processor determines that the probe pulse captured the heart, and decreases the interval for delivery of a subsequent probe pulse.

46. The medical device of claim 45, wherein the processor determines that the subsequently delivered probe pulse captured the heart, and controls delivery of a probe pulse every cardiac cycle until one of the delivered probe pulses does not capture the heart in response to the determination, each probe pulse delivered an interval after detection of a systolic depolarization of the heart that is less than a previous probe pulse.

47. The medical device of claim 43, wherein the processor determines that the probe pulse did not capture the heart, and increases the interval for delivery of a subsequent probe pulse.

48. The medical device of claim 47, wherein the processor determines that the subsequently delivered probe pulse did not capture the heart, and controls delivery of a probe pulse every cardiac cycle until one of the delivered probe pulses captures the heart in response to the determination, each probe pulse delivered an interval after detection of a systolic depolarization of the heart that is greater than a previous probe pulse.

49. The medical device of claim 43, wherein the processor sets a parameter for delivery of extra-systolic stimulation to the heart based on the estimated length.

50. The medical device of claim 49, wherein the processor sets an extra-systolic interval for delivery of extra-systolic stimulation to the heart based on the estimated length.

51. The medical device of claim 43, wherein the medical device is implantable within the patient.

52. The medical device of claim 43, wherein the medical device is a pacemaker.

53. A computer-readable medium comprising instructions that cause a programmable processor to:

detect a systolic depolarization of a heart;

control delivery of a probe pulse an interval after detection of the systolic depolarization;

determine whether the probe pulse captured the heart; and estimate a length of a refractóry period of the heart based on the determination.

54. The computer-readable medium of claim 53,

wherein the instructions that cause a programmable processor to control delivery of a probe pulses comprise instructions that cause a programmable processor to control delivery of a first probe pulse a first interval after detection of a first systolic depolarization of a first cardiac cycle and a second probe pulse a second interval after detection of a second systolic depolarization of a second cardiac cycle,

the medium further comprising instructions that cause a programmable processor to determine that the first probe pulse captured the heart and the second probe pulse did not capture the heart, and

wherein the instructions that cause a programmable processor to estimate the length of the refractory period comprise instructions that cause a programmable processor to estimate the length of the refractory period as a value between the first and second intervals.

55. The computer-readable medium of claim 53, further comprising instructions that cause a programmable processor to:

determine that the probe pulse captured the heart; and

decrease the interval for delivery of a subsequent probe pulse.

56. The computer-readable medium of claim 55, further comprising instructions that cause a programmable processor to:

determine that the subsequently delivered probe pulse captured the heart; and control delivery of a probe pulse every cardiac cycle until one of the delivered probe pulses does not capture the heart in response to the determination, each probe pulse delivered an interval after detection of a systolic depolarization of the heart that is less than a previous probe pulse.

57. The computer-readable medium of claim 53, further comprising instructions that cause a programmable processor to:

determine that the probe pulse did not capture the heart; and

increase the interval for delivery of a subsequent probe pulse.

58. The computer-readable medium of claim 57, further comprising instructions that cause a programmable processor to:

determine that the subsequently delivered probe pulse did not capture the heart; and

control delivery of a probe pulse every cardiac cycle until one of the delivered probe pulses captures the heart in response to the determination, each probe pulse delivered an interval after detection of a systolic depolarization of the heart that is greater than a previous probe pulse.

59. The computer-readable medium of claim 53, further comprising instructions that cause a programmable processor to set a parameter for delivery of extra-systolic stimulation to the heart based on the estimated length.

60. The computer-readable medium of claim 59, wherein the instructions that cause a programmable processor to set a parameter for delivery of extra-systolic stimulation comprise instructions that cause a programmable processor to set an extra-systolic interval.

61. A method comprising:

measuring a delay between delivery of a pulse to a heart and detection of an evoked response resulting from delivery of the pulse; and

adjusting a parameter for delivery of extra-systolic stimulation to the heart based on the delay.

62. The method of claim 61, wherein adjusting a parameter comprises adjusting an extra-systolic interval.

63. The method of claim 62, wherein the pulse is a probe pulse, the method further comprising:

detecting a systolic depolarization of the heart; and

delivering the probe pulse an interval after detection of the systolic depolarization, the interval less than the extra-systolic interval.

64. The method of claim 63, wherein adjusting the extra-systolic interval comprises:

comparing the delay to a threshold value; and

adjusting the extra-systolic interval based on the comparison.

65. The method of claim 63, wherein delivering the probe pulse comprises delivering a probe pulse every N cardiac cycles, N being an integer greater than one, the method further comprising delivering extra-systolic pulses the extra-systolic interval after detection of systolic depolarizations of the heart during cardiac cycles in which a probe pulse is not delivered.

66. The method of claim 63, wherein delivering the probe pulse comprises:

delivering a first probe pulse of a pair a first interval after detection of a systolic depolarization of a first cardiac cycle; and

delivering a second probe pulse of the pair a second interval after detection of a systolic depolarization of a second cardiac cycle,

wherein the second interval is greater than the first interval, and the first and second intervals are less than the extra-systolic interval,

wherein measuring a delay between delivery of the probe pulse and detection of the evoked response comprises measuring a first delay subsequent to delivery of the first probe pulse and a second delay subsequent to delivery of the second probe pulse, and

wherein adjusting the extra-systolic interval comprises adjusting the extra-systolic interval based on the first and second delays.

67. The method of claim 66, wherein adjusting the extra-systolic interval comprises:

determining that the second delay is longer than the first delay; and
increasing the extra-systolic interval in response to the determination.

68. The method of claim 66, wherein adjusting the extra-systolic interval comprises:

determining that the first and second delays are substantially equal; and
decreasing the extra-systolic interval in response to the determination.

69. The method of claim 66, wherein adjusting the extra-systolic interval comprises:

determining that the first delay is greater than the second delay; and maintaining the extra-systolic interval at a current value in response to the determination.

70. A medical device comprising:

electrodes; and

a processor to control delivery of pulses and extra-systolic stimulation to a heart of a patient and detect evoked responses via the electrodes, wherein the processor measures a delay between delivery of a pulse to the heart and detection of an evoked response resulting from delivery of the pulse, and adjusts a parameter for delivery of extra-systolic stimulation to the heart based on the delay.

71. The medical device of claim 70, wherein the parameter comprises an extra-systolic interval.

72. The medical device of claim 71, wherein the pulse is a probe pulse, and the processor detects a systolic depolarization of the heart via the electrodes and controls delivery of the probe pulse to the heart an interval after detection of the systolic depolarization, the interval less than the extra-systolic interval.

73. The medical device of claim 72, wherein the processor compares the delay to a threshold value, and adjusts the extra-systolic interval based on the comparison.

74. The medical device of claim 72, wherein the processor controls delivery of a probe pulse every N cardiac cycles, N being an integer greater than one, and controls delivery of extra-systolic pulses the extra-systolic interval after detection

of systolic depolarizations during cardiac cycles in which a probe pulse is not delivered.

75. The medical device of claim 72,

wherein the processor controls delivery of a first probe pulse of a pair a first interval after detection of a systolic depolarization of a first cardiac cycle, and controls delivery of a second probe pulse of the pair a second interval after a systolic depolarization of a second cardiac cycle,

wherein the second interval is greater than the first interval, and the first and second intervals are less than the extra-systolic interval, and

wherein the processor measures a first delay subsequent to delivery of the first probe pulse and a second delay subsequent to delivery of the second probe pulse, and adjusts the extra-systolic interval based on the first and second delays.

76. The medical device of claim 75, wherein the processor determines that the second delay is longer than the first delay, and increases the extra-systolic interval in response to the determination.

77. The medical device of claim 75, wherein the processor determines that the first and second delays are substantially equal, and decreases the extra-systolic interval in response to the determination.

78. The medical device of claim 75, wherein the processor determines that the first delay is greater than the second delay, and maintains the extra-systolic interval at a current value in response to the determination.

79. The medical device of claim 70, wherein the medical device is implantable within the patient.

80. The medical device of claim 70, wherein the medical device is a pacemaker.

81. A computer-readable medium comprising instructions that cause a programmable processor to:

measure a delay between delivery of a pulse to a heart and detection of an evoked response resulting from delivery of the pulse; and

adjust a parameter for delivery of extra-systolic stimulation to the heart based on the delay.

82. The computer-readable medium of claim 81, wherein the parameter comprises an extra-systolic interval.

83. The computer-readable medium of claim 82, wherein the pulse is a probe pulse, the medium further comprising instructions that cause a programmable processor to:

detect a systolic depolarization of the heart; and

control delivery of the probe pulse to the heart an interval after detection of the systolic depolarization, the interval less than the extra-systolic interval.

84. The computer-readable medium of claim 83, wherein the instructions that cause a programmable processor to adjust the extra-systolic interval comprise instructions that cause a programmable processor to:

compare the delay to a threshold value; and adjust the extra-systolic interval based on the comparison.

85. The computer-readable medium of claim 83, wherein the instructions that cause a programmable processor to control delivery of the probe pulse comprise instructions that cause a programmable processor to control delivery of a probe pulse every N cardiac cycles, N being an integer greater than one, the medium further comprising instructions that cause a programmable processor to control delivery of extra-systolic pulses the extra-systolic interval after detection of systolic depolarizations of the heart during cardiac cycles in which a probe pulse is not delivered.

86. The computer-readable medium of claim 83,

wherein the instructions that cause a programmable processor to control delivery of the probe pulse comprise instructions that cause a programmable processor to:

control delivery of a first probe pulse of a pair a first interval after detection of a systolic depolarization of a first cardiac cycle; and

control delivery of a second probe pulse of the pair a second interval after a systolic depolarization of a second cardiac cycle,

wherein the second interval is greater than the first interval, and the first and second intervals are less than the extra-systolic interval,

wherein the instructions that cause a programmable processor to measure a delay between delivery of the probe pulse and detection of the evoked response comprise instructions that cause a programmable processor to measure a first delay subsequent to delivery of the first probe pulse and a second delay subsequent to delivery of the second probe pulse, and wherein the instructions that cause a programmable processor to adjust the extra-systolic interval comprise instructions that cause a programmable processor to adjust the extra-systolic interval based on the first and second delays.

87. The computer-readable medium of claim 86, wherein the instructions that cause a programmable processor to adjust the extra-systolic interval comprise instructions that cause a programmable processor to:

determine that the second delay is longer than the first delay; and

increase the extra-systolic interval in response to the determination.

88. The computer-readable medium of claim 86, wherein the instructions that cause a programmable processor to adjust the extra-systolic interval comprise instructions that cause a programmable processor to:

determine that the first and second delays are substantially equal; and

decrease the extra-systolic interval in response to the determination.

89. The computer-readable medium of claim 86, wherein the instructions that cause a programmable processor to adjust the extra-systolic interval comprise instructions that cause a programmable processor to:

determine that the first delay is greater than the second delay; and

maintain the extra-systolic interval at a current value in response to the determination.

90. A method comprising:

measuring intervals between delivery of extra-systolic pulses to a heart and subsequent depolarizations of the heart; and detecting an arrhythmia of the heart based on the intervals.

91. The method of claim 90, wherein detecting an arrhythmia of the heart comprises detecting an arrhythmia of the heart based on the stability of the intervals.

92. The method of claim 90, wherein detecting an arrhythmia of the heart comprises:

determining a difference between a current interval and a previous interval;

comparing the difference to a threshold value; and

detecting an arrhythmia based on the comparison.

93. The method of claim 92, wherein detecting an arrhythmia based on the comparison comprises:

morphologically analyzing a current depolarization based on the comparison; and

detecting an arrhythmia based on the morphological analysis.

94. The method of claim 93, wherein morphologically analyzing the current depolarization comprises at least one of measuring a width of the depolarization and applying a wavelet analysis to the depolarization.

95. The method of claim 92, wherein the extra-systolic pulses are paired and coupled, and determining a difference between a current interval and a previous interval comprises:

determining a difference between a current interval associated with a current paired pulse and a previous interval associated with a previous paired pulse; and

determining a difference between a current interval associated with a current coupled pulse and a previous interval associated with a previous coupled pulse.

96. The method of claim 90, further comprising:

delivering extra-systolic stimulation pulses an extra-systolic interval after detection of systolic depolarizations of the heart;

periodically delivering probe pulses an interval after detection of systolic depolarizations of the heart that is less than the extra-systolic interval for determination of an adjustment to the extra-systolic interval; and

suspending measurement of intervals between delivery of extra-systolic pulses to a heart and subsequent depolarizations of the heart during cardiac cycles in which a probe pulse is delivered to the heart.

97. The method of claim 90, further comprising suspending delivery of extra-systolic pulses in response to the detection.

98. The method of claim 97, wherein suspending delivery of extra-systolic pulses comprises suspending delivery of extra-systolic pulses for a single cardiac cycle.

99. The method of claim 90, further comprising delivering a therapy to treat the arrhythmia in response to the detection.

100. A medical device comprising:

electrodes; and

a processor to control delivery of extra-systolic pulses to a heart and detect depolarizations of the heart via the electrodes, wherein the processor measures intervals between delivery of extra-systolic pulses and subsequent depolarizations, and detects an arrhythmia of the heart based on the intervals.

101. The medical device of claim 100, wherein the processor detects an arrhythmia of the heart based on the stability of the intervals.

102. The medical device of claim 100, wherein the processor determines a difference between a current interval and a previous interval, compares the difference to a threshold value, and detects an arrhythmia based on the comparison.

103. The medical device of claim 102, the processor morphologically analyzes a current depolarization based on the comparison, and detects an arrhythmia based on the morphological analysis.

104. The medical device of claim 103, wherein the morphological analysis includes at least one of measuring a width of the depolarization and applying a wavelet analysis to the depolarization.

105. The medical device of claim 102, wherein the extra-systolic pulses are paired and coupled, and the processor determines differences between current intervals associated with current paired pulses and previous intervals associated with previous paired pulses, and determines differences between current

intervals associated with current coupled pulses and previous intervals associated with previous coupled pulses.

106. The medical device of claim 100, wherein the processor controls delivery of extra-systolic stimulation pulses via the electrodes an extra-systolic interval after detection of systolic depolarizations of the heart, controls periodic delivery of probe pulses via the electrodes an interval after detection of systolic depolarizations of the heart that is less than the extra-systolic interval for determination of an adjustment to the extra-systolic interval, and suspends measurement of intervals between delivery of extra-systolic pulses to a heart and subsequent depolarizations of the heart during cardiac cycles in which a probe pulse is delivered to the heart.

107. The medical device of claim 100, wherein the processor suspends delivery of extra-systolic pulses in response to the detection.

108. The medical device of claim 107, wherein the processor suspends delivery of extra-systolic pulses for a single cardiac cycle.

109. The medical device of claim 100, wherein the processor controls delivery of a therapy to treat the arrhythmia in response to the detection.

110. The medical device of claim 100, wherein the medical device is implantable within a patient.

111. The medical device of claim 100, wherein the medical device comprises a pacemaker.

112. A computer-readable medium comprising instructions that cause a programmable processor to:

measure intervals between delivery of extra-systolic pulses to a heart and subsequent depolarizations of the heart; and

detect an arrhythmia of the heart based on the intervals.

113. The computer-readable medium of claim 112, wherein the instructions that cause a programmable processor to detect an arrhythmia of the heart comprise instructions that cause a programmable processor to detect an arrhythmia of the heart based on the stability of the intervals.

114. The computer-readable medium of claim 112, wherein the instructions that cause a programmable processor to detect an arrhythmia of the heart comprise instructions that cause a programmable processor to:

determine a difference between a current interval and a previous interval;

compare the difference to a threshold value; and

detect an arrhythmia based on the comparison.

115. The computer-readable medium of claim 114, wherein the instructions that cause a programmable processor to detect an arrhythmia based on the comparison comprise instructions that cause a programmable processor to:

morphologically analyze a current depolarization based on the comparison; and

detect an arrhythmia based on the morphological analysis.

116. The computer-readable medium of claim 114, wherein the extra-systolic pulses are paired and coupled, and the instructions that cause a programmable processor to determine a difference between a current interval and a previous interval comprise instructions that cause a programmable processor to:

determine a difference between a current interval associated with a current paired pulse and a previous interval associated with a previous paired pulse; and

determine a difference between a current interval associated with a current coupled pulse and a previous interval associated with a previous coupled pulse.

117. The computer-readable medium of claim 112, further comprising instructions that cause a programmable processor to:

control delivery of extra-systolic stimulation pulses an extra-systolic interval after detection of systolic depolarizations of the heart;

control period delivery of probe pulses an interval after detection of systolic depolarizations of the heart that is less than the extra-systolic interval for determination of an adjustment to the extra-systolic interval; and

suspend measurement of intervals between delivery of extra-systolic pulses to a heart and subsequent depolarizations of the heart during cardiac cycles in which a probe pulse is delivered to the heart.

118. The computer-readable medium of claim 112, further comprising instructions that cause a programmable processor to suspend delivery of extra-systolic pulses in response to the detection.

119. The computer-readable medium of claim 118, wherein the instructions that cause a programmable processor to suspending delivery of extra-systolic pulses comprise instructions that cause a programmable processor to suspend delivery of extra-systolic pulses for a single cardiac cycle.

120. The computer-readable medium of claim 112, further comprising instructions that cause a programmable processor to control delivery of a therapy to treat the arrhythmia in response to the detection.